

Docket No.: 248993US23

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

IN RE APPLICATION OF:

GROUP: 1615

Jim THRELKELD et al.

SERIAL NO: 10/785,060

EXAMINER: MERCIER, MELISSA S

FILED: February 25, 2004

FOR: METHOD FOR PROVIDING ANTIMICROBIAL COMPOSITE YARNS,  
COMPOSITE FABRICS AND ARTICLES MADE THEREFROM

**DECLARATION UNDER 37 C.F.R. § 1.132**

COMMISSIONER FOR PATENTS  
ALEXANDRIA, VIRGINIA 22313

Sir:

Now comes \_James Threlkeld who deposes and states that:

1. I am a graduate of Wake Forest College and received my BS degree in the year 1959.
2. I have been employed by Chemstrand Research Center, Fycon Technology and Others for 50 years as a Chemist in the field of Textiles.
3. The following experiments were carried out by me or under my direct supervision and control.

Fabrics were prepared from composite yarn having the following construction:

Core: Fiberglass #450 (nominal 100 denier) and ultra-high molecular weight polyethylene (nominal 400 denier)

1<sup>st</sup> wrap: 70 denier polyester

2<sup>nd</sup> wrap: 70 denier polyester

The fabric was then treated in accordance with the present invention using a silicone based quaternary ammonium salt antimicrobial agent that is a copolymer of a long chain (C<sub>12</sub>-C<sub>20</sub>) alkyl dimethylaminotrihydroxysilylpropyl ammonium halide and a chloroalkyl trihydroxysilane, with the drying step being performed at a temperature of 90°C or less.

The resulting treated fabric was tested in accordance with ASTM E2149-01 against three different bacteria (E. coli; S. Aureus; methicillin resistant S. Aureus) and in accordance with AATCC 30-III against one fungus (A. niger), and compared against untreated samples of the same fabric. The results are reported below.

TABLE 1 (Bacterial testing)

	Microbiological Analysis (according to ASTM E2149-01)		
	Initial Concentration	Final Concentration	Percent Reduction
<b>S. aureus ATCC 6538</b>			
Untreated fabric	$1.33 \times 10^5$ / ml	$1.15 \times 10^5$ / ml	0%
Treated fabric	$1.33 \times 10^5$ / ml	$<1.0 \times 10^1$ / ml	>99.99%
Inoculum control	$1.33 \times 10^5$ / ml	$1.22 \times 10^5$ / ml	0%
<b>Methicillin resistant S. aureus</b>			
Untreated fabric	$1.52 \times 10^5$ / ml	$1.6 \times 10^5$ / ml	0%
Treated fabric	$1.52 \times 10^5$ / ml	$<1.0 \times 10^1$ / ml	>99.99%
Inoculum control	$1.52 \times 10^5$ / ml	$1.55 \times 10^5$ / ml	0%

TABLE 2 (multi wash/dry test using E. coli)

Description	Microbiological Analysis		Chemical Analysis			
	ASTM E2149-01		Uniformity		% Extraction	
	Initial	5X	Initial	5X	Initial	5X
Untreated	<20%	28%	No Color	No Color	12%	20%
Treated	99.99%	99.5%	Excellent	Excellent	97%	88%

ASTM E2148-01  
1.0g sample  
50 ml 0.3 wt% KH<sub>2</sub>PO<sub>4</sub>  
1x10<sup>7</sup> Escherichia coli/ml  
0.01% Q2-5211 wetting agent  
1 hour contact time

ASTM 0208 SPB Direct Stain  
(Uniformity):  
1.0g sample  
0.025% BV% CH<sub>2</sub>CO solution  
20 minute exposure

ASTM 0210 SPB Extraction (EXT):  
1.0g sample  
0.001% BV% CH<sub>2</sub>CO solution  
20 minute exposure  
90mins Absorbance  
0.01% Q2-5211 wetting agent

AATCC 81-1998 Accelerated Laundering  
(Washes)  
1x10<sup>7</sup> E. coli  
40° ± 2°C  
50 Steel Balls  
0.15% AATCC Standard Reference Detergent  
ACTM 0001 Post Laundering Protocol

TABLE 3 (fungal test; *Aspergillus niger* ATCC 6275)

	MICROBIOLOGICAL ANALYSIS	
	Fungal rating after 4 weeks of incubation (0-4 scale)	
Untreated fabric sample	4	No antifungal activity
Treated fabric sample	0	Excellent Antifungal activity

These data show that in each case, the untreated fabrics had no ability on their own to protect against bacteria or fungi, while the fabric treated in accordance with the present invention provided >99.99% reduction of bacterial presence, and maintained the effectiveness even through multiple accelerated wash/dry cycles under the AATCC 61-1996 Accelerated Laundering standard. Further, the present invention provided nearly complete protection against even MRSA (methicillin resistant staphylococcus aureus). The present invention also was shown to be effective against not only bacteria, but also against fungi.

One of ordinary skill would not expect to achieve such activity using the present invention antimicrobial agent under such mild treatment conditions. The above results are particularly surprising given the teaching of Smith III that such an antimicrobial agent requires much higher temperatures of drying in order to provide the treated article with antimicrobial properties.

4. The undersigned petitioner declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

U.S. Application Serial No. 10/785,060  
Rule 1.132 Declaration

5. Further deponent saith not.

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22850

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Signature

Date